

Shiseido discovers an effect of Benibana (Safflower) extract on the structural stability of blood capillary

- Application of holistic aging care focusing on blood vessels -

Shiseido Company, Limited ("Shiseido") discovered that the extract from Mogami-Benibana, a variety of safflower traditionally grown in the Japanese prefecture of Yamagata, has a structural stabilizing effect on the blood capillary. It is known that the vascular structure is stabilized by two elements: the adhesion of vascular wall cells onto the endothelial cells, and the adhesion of endothelial cells to each other (cell-cell adhesion) (Figure 1). Shiseido has addressed the interaction between vascular endothelial cells and vascular wall cells for promoting the vascular structure stability^{*1}. Recently, it started targeting the other main vascular stabilizing component, cell-cell adhesion, through influencing the expression of the VE-cadherin protein that is responsible for cell-cell adhesion of endothelial cells. In this study, it has focused on the effect of Mogami-Benibana extract on blood vessels, in hopes of creating new solutions for aging distresses such as dark spots, dullness, wrinkles, and facial sagging.

^{*1} Shiseido Elucidates Involvement of Aging-related Functional Decline of Skin Capillaries in Skin Aging(2009)

https://corp.shiseido.com/jp/newsimg/archive/00000000001072/1072_s2e08_jp.pdf(Japanese only)

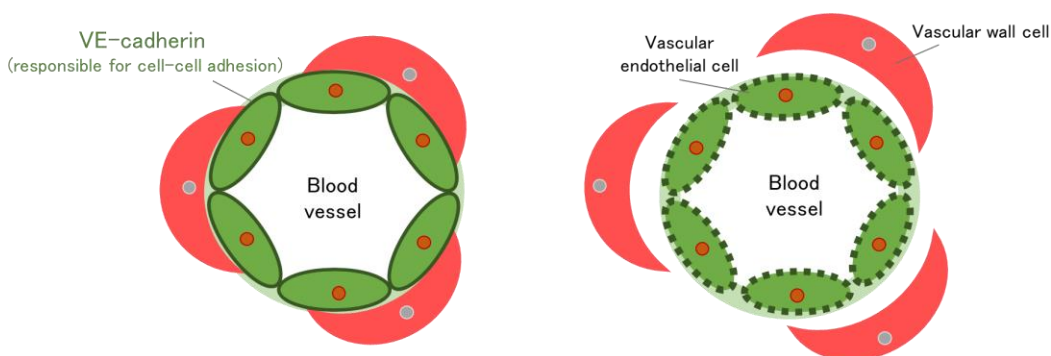


Figure 1. Blood vessel with a stable structure (left), blood vessel with an unstable structure (right)
(dark green: VE-cadherin, green: vascular endothelial cells, red: vascular wall cells)

The vascular structure is stabilized by two main elements: vascular wall cell adhesion and vascular endothelial cell-cell adhesion.

Research background

Shiseido has focused on vascular, nerve, and immune systems in relation to the skin from early years, because it believes that the skin's natural beauty comes from the body. For blood vessels in particular, the company has developed and utilized its own unique observation technology to clarify the state of blood vessels in association to various skin concerns such as dark spots, wrinkles, and facial sagging.

Shiseido has focused on safflower for more than 30 years and confirmed that safflower extract contains adenosine, which is known to promote blood flow. As a Japanese-born company, Shiseido has valued Mogami-Benibana, a variety of safflower traditionally grown in the Japanese prefecture of Yamagata (hereinafter referred to as Benibana extract). As the relationship between blood vessels and beauty is attracting great attention, this study was set to explore the effect of a unique Benibana extract on blood vessels.

Confirmation of the function of Benibana extract on the capillaries

Capillaries have a two-layered structure consisting of vascular endothelial cells and vascular wall cells. In addition to the adhesion between endothelial cells and vascular wall cells, the adhesion of endothelial cells to each other is vital for structural stability in capillaries. To investigate the effect of Benibana extract on the structural

stability of blood vessels, we performed an *in vitro* experiment. It revealed that Benibana extract promotes a dense gathering of VE-cadherin at cell-cell adhesion sites (Figure 2) and increases the level of VE-cadherin expression (Figure 3). These results suggested that Benibana extract has an effect on stabilizing the vascular structure through influencing VE-cadherin.

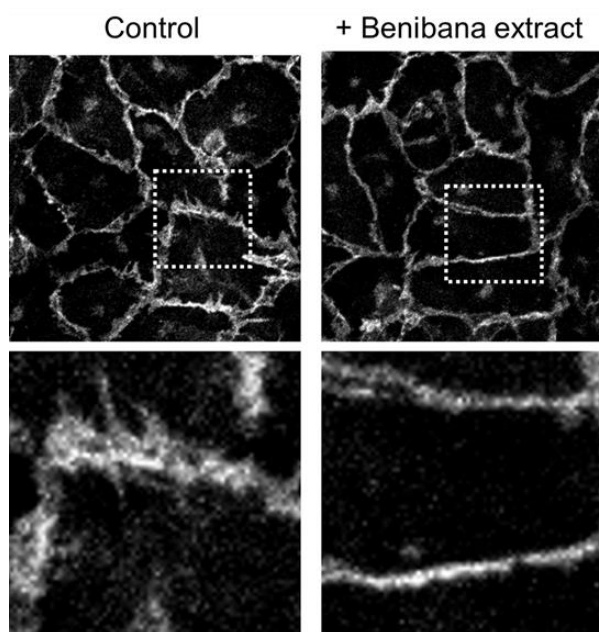


Figure 2. Expression of VE-cadherin

Application of Benibana extract causes VE-cadherin to densely gather in cell-cell adhesion sites.

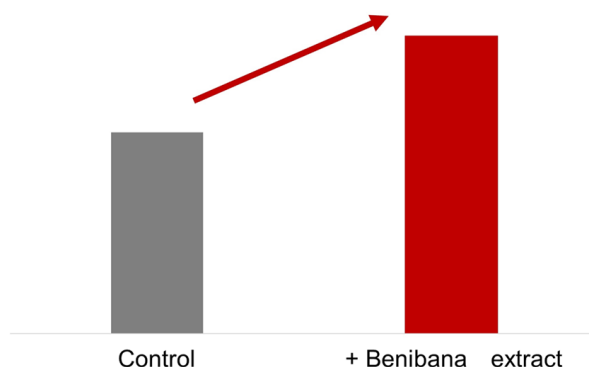


Figure 3. Change in the level of VE-cadherin expression

Future prospects

This study revealed that the extract developed by Shiseido from Benibana, a variety of safflower traditionally grown in the Japanese prefecture of Yamagata, has an effect on stabilizing blood vessel structure. This finding will be applied to create solutions targeted on blood vessel condition and blood flow in aims to solve aging distress such as dark spots, dullness, wrinkles, and facial sagging.

References: News Release on Shiseido's Vascular Research

News Release on Capillary Research (since 2009)

• Shiseido Discovers that Capillaries Promote Epidermal Regeneration(2022)

<https://corp.shiseido.com/en/news/detail.html?n=00000000003494>

• Shiseido Confirms New Factors Leading to Blood Vessel-mediated Dark Spot Formation(2020)

<https://corp.shiseido.com/jp/news/detail.html?n=00000000003009>(Japanese only)

• Shiseido Succeeds in World-Leading 3D Visualization of Capillaries for the Whole Face(2020)

<https://corp.shiseido.com/en/news/detail.html?n=00000000002992>

*Received Top Award at the International Federation of Societies of Cosmetic Chemists (IFSCC) Conference 2019 in Milan

•Shiseido Elucidates Mechanism by Which Capillaries Maintain Skin Elasticity(2020)

<https://corp.shiseido.com/en/news/detail.html?n=00000000002911>

•Shiseido Reveals the Relevance of Capillaries in Skin Elasticity(2019)

<https://corp.shiseido.com/en/news/detail.html?n=00000000002780>

•Shiseido Succeeds in 3D Visualization of Vascular Malformation in Pigmented Skin

<https://corp.shiseido.com/en/news/detail.html?n=00000000002498>

•Shiseido Discovers Abnormal Capillary Network is Involved in Dark Spot Formation(2017)

<https://corp.shiseido.com/jp/news/detail.html?n=00000000002264>(Japanese only)

•Shiseido Succeeds in Visualizing Capillaries without Cutting the Skin(2017)

<https://corp.shiseido.com/jp/news/detail.html?n=00000000002265>(Japanese only)

•Shiseido Elucidates Involvement of Aging-related Functional Decline of Skin Capillaries in Skin Aging(2009)

https://corp.shiseido.com/jp/newsimg/archive/00000000001072/1072_s2e08_jp.pdf(Japanese only)

About Our R&D Strategy:

This study was conducted as a part of research in the area of skin foundation, which aims to elucidate the association of the skin with the conditions inside the skin, such as blood vessels, lymphatic vessels, immunity, and nerves, under Skin Beauty INNOVATION, one of the three pillars of Shiseido's R & D strategy.

- Integrated Report 2022 (Beauty Innovation)

https://corp.shiseido.com/report/en/2022/value_creation/innovation/

- Keywords

Skin Beauty INNOVATION, skin foundation, blood vessels

<Reference>

Researchers' challenges

■R&D Philosophy DYNAMIC HARMONY approach

This research was carried out under the Inside/Outside approach of Shiseido's R&D philosophy, DYNAMIC HARMONY. Focusing on the relationships between the skin, body, and mind, we took on the bold challenge of creating new value with the aim of drawing out the inherent healthy beauty within each customer.

■Blood vessels and skin

The main researcher challenged herself in a new field of research. Human vascular endothelial cells are delicate and uneasy to handle, and the experimental techniques had to be optimized in order to obtain reliable results. She successfully established an *in vitro* experimental system to study the structural stability of blood vessel and discovered the effect of the extract from Mogami-Benibana on blood vessels.

Shiseido has been working on blood vessel research for over 20 years. To achieve healthy skin, we need to understand not only the surface of the skin but also the inside of the skin, and we believe that it is particularly important to clarify the function of blood vessels because they form a network that provides nutrition and oxygen to all organs in the body. This result of Benibana extract has added a new page to the history of Shiseido's blood vessel research.



Ayumi Kikuchi,
Researcher

Shiseido's R&D Philosophy DYNAMIC HARMONY

- Shiseido Formulates Its Unique R&D Philosophy "DYNAMIC HARMONY" (2021)

<https://corp.shiseido.com/en/news/detail.html?n=00000000003252>

- DYNAMIC HARMONY website:
<https://corp.shiseido.com/en/rd/dynamicharmony>